

IN THE CLAIMS

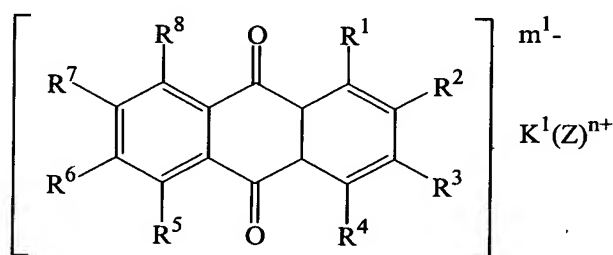
1. A thermoplastic resin composition for laser welding comprising:

- 1) thermoplastic resin; and
- 2) laser-transmitting black colorant comprising amine salts of anthraquinone dye and monoazo complex dye.

2. A thermoplastic resin composition for laser welding comprising:

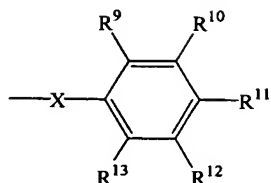
- 1) thermoplastic resin; and,
- 2) laser-transmitting black colorant comprising a mixture of
  - a) amine salt of anthraquinone dyes of formula [I] or formula [II]

wherein Formula [I] is:

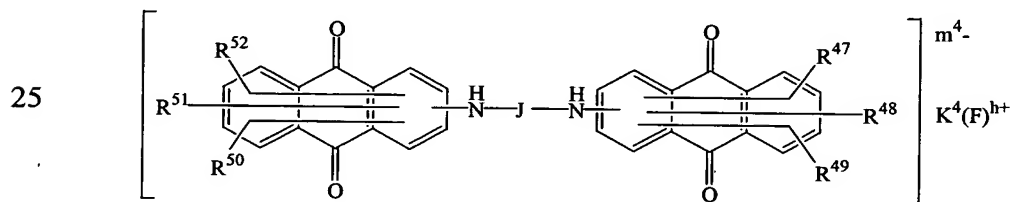


wherein  $\text{R}^1$  to  $\text{R}^8$ , which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxycarbonyl, cyclohexylamide, sulfonyl, formula [I-a], or -Y-W, and at least one of  $\text{R}^1$  to  $\text{R}^8$  is of formula [I-a]; wherein Y is S, O, or NH; and wherein W is selected from unsubstituted or substituted alkyl group, alkenyl group, and unsubstituted or substituted aryl group; wherein  $(\text{Z})^{n+}$  represents a cation derived from an organic amine compounds or a basic dye; wherein n is 1 or 2,  $m^1$  is an integer from 1 to 4 and  $\text{K}^1$  is the ratio of  $m^1 / n$ ; and wherein formula [I-a] is:

5



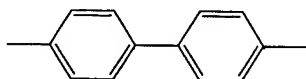
wherein X is O or NH, and R<sup>9</sup> to R<sup>13</sup>, which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, N-alkylamide, N-arylamide, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxy carbonyl, or sulfonyl; wherein at least one of R<sup>1</sup> to R<sup>8</sup> and R<sup>9</sup> to R<sup>13</sup> is sulfonyl group; wherein formula [II] is:



30

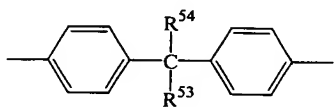
wherein R<sup>47</sup> to R<sup>52</sup>, which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, N-alkylamide, N-arylamide, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxy carbonyl, or sulfonyl; and at least one of R<sup>47</sup> to R<sup>52</sup> is of sulfonyl, and formula J in formula [II] is selected from formula [II-a] or formula [II-b] and binds two anthraquinone formula [II-a]:

40



or

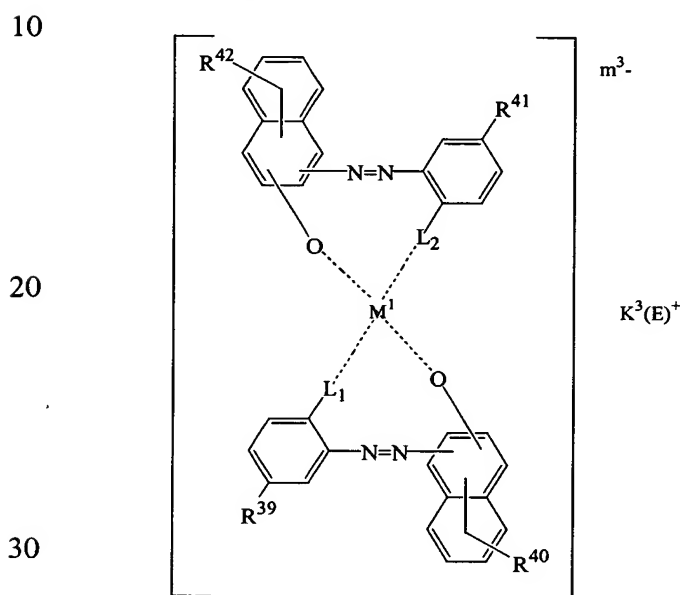
45 formula [II-b]:



wherein  $R^{53}$  to  $R^{54}$ , which may be the same or different, are independently selected from the group consisting of alkyl(having 1 to 8 carbon atoms) or hydrogen, and wherein  $(F)^{h+}$  represents ammonium ion or a cation derived from an organic amino compounds or a basic dye wherein h is 1 or 2,  $m^4$  is an integer from 1 to 4 and  $K^4$  is the ratio of  $m^4 / h$ , and

b) monoazo complex dye represented by the formula [III]

formula [III]:



wherein  $R^{39}$ ,  $R^{41}$ , which may be the same or different, are Cl,  $SO_2(-R^{44})(-R^{45})$ , or  $SO_2R^{43}$ ;  $R^{44}$  and  $R^{45}$ , which may be the same or different, are independently hydrogen atom, liner or branched C1-C4 alkyl,  $R^{43}$  is linear or branched C1-C4 alkyl;  $R^{40}$  and  $R^{42}$ , which may be the same or different, are hydrogen, liner or branched C1-C18 alkyl group, liner or branched C2-C18 alkenyl group, sulfonamide group, carboxyl group, mesyl group, hydroxyl group, C1-C18 alkoxy group, acethylamino group, benzoylamino group, halogen atom or  $-CONH-R^{46}$ ;  $R^{46}$  is functional group selected from unsubstituted or substituted liner or branched C1-C18 alkyl or unsubstituted or substituted C6-C18 aryl group;  $L_1$  and  $L_2$  are independently O or COO;  $(E)^+$  are  $H^+$ , cation of alkali metal, ammonium ion, cations of organic amine including aliphatic primary, secondary and tertiary amines, quaternary ammonium ion;  $K^3$  is an integer;  $m^3$

is 0, 1 or 2; and  $M^1$  is a metal having ionic valency from 2 to 4.

3. The composition of Claim 1 wherein the laser-transmitting black colorant comprises amine salts of anthraquinone dye of formula [I] wherein at least one of  $R^9$ ,  $R^{10}$ ,  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  of formula [I-a] is sulfonyl group.

4. The composition of Claim 1 wherein the amount of the amine salts of anthraquinone dyes of formula [I] or formula [II] compared to the amount of monoazo complex dyes of the formula [III] is in a ratio of from 5:1 to 1:1.

5. The composition of Claim 1 wherein the thermoplastic resin is polyamide or polyester.

6. The composition of Claim 1 further comprising reinforcing agent.

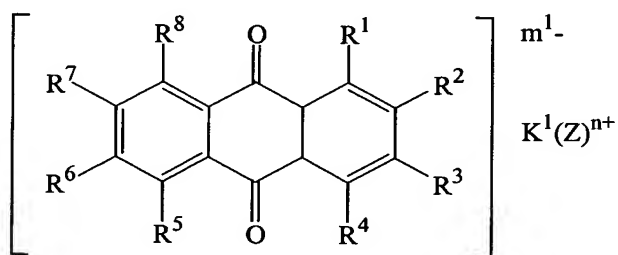
7. A transparent article for laser beam welding formed from the composition of Claim 1.

8. An article formed by laser welding an opaque article for laser beam with the transparent article of Claim 6 using said laser beam.

9. A black colorant suitable for being mixed with a thermoplastic resin used in laser welding applications applied to a laser welding comprising a mixture of

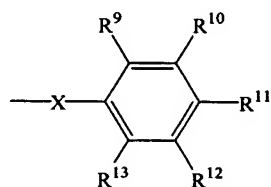
a) amine salts of anthraquinone dyes of formula [I] or formula [II]

wherein Formula [I] is:

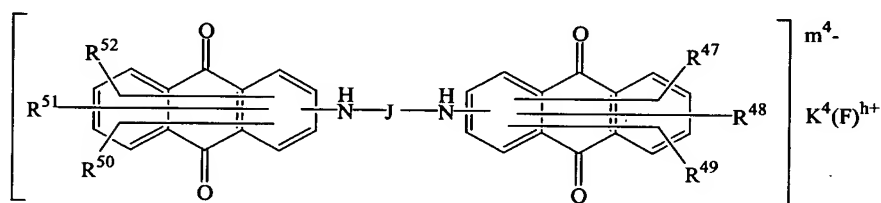


wherein  $R^1$  to  $R^8$ , which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxycarbonyl, cyclohexylamide, sulfonyl, formula [I-a], or -Y-W, and at least one of  $R^1$  to  $R^8$  is of formula [I-a]; wherein Y is S, O, or NH; and wherein W is selected from unsubstituted or substituted alkyl group, alkenyl group, and unsubstituted or substituted aryl group; wherein  $(Z)^{n+}$  represents a cation derived from an organic amine compounds or a basic

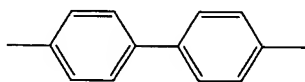
dye; wherein  $n$  is 1 or 2,  $m^1$  is an integer from 1 to 4 and  $K^1$  is the ratio of  $m^1 / n$ ; and wherein formula [I-a] is:



wherein  $X$  is O or NH, and  $R^9$  to  $R^{13}$ , which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, N-alkylamide, N-arylamide, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxy carbonyl, or sulfonyl; wherein at least one of  $R^1$  to  $R^8$  and  $R^9$  to  $R^{13}$  is sulfonyl group; wherein formula [II] is:

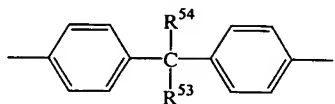


wherein  $R^{47}$  to  $R^{52}$ , which may be the same or different, are independently selected from the group consisting of H, alkyl, aryl, alkenyl, alkoxy, amino, N-alkylamide, N-arylamide, hydroxy, halogen atom, acyl, acyloxy, acylamide, acyl-N-alkylamide, carboxyl, alkoxy carbonyl, or sulfonyl; and at least one of  $R^{47}$  to  $R^{52}$  is of sulfonyl, and formula  $J$  in formula [II] is selected from formula [II-a] or formula [II-b] and binds two anthraquinone; formula [II-a]:



or

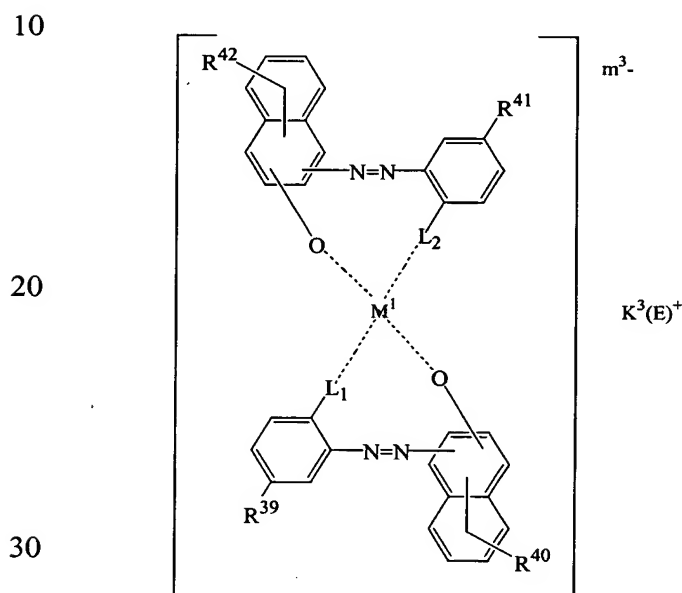
formula [II-b]:



wherein  $R^{53}$  to  $R^{54}$ , which may be the same or different, are independently selected from the group consisting of alkyl(having 1 to 8 carbon atoms) or hydrogen, and wherein  $(F)^{h+}$  represents ammonium ion or a cation derived from an organic amino compounds or a basic dye wherein h is 1 or 2,  $m^4$  is an integer from 1 to 4 and  $K^4$  is the ratio of  $m^4 / h$ , and

b) monoazo complex dye represented by the formula [III]

formula [III]:



wherein  $R^{39}$ ,  $R^{41}$ , which may be the same or different, are Cl,  $SO_2(-R^{44})(-R^{45})$ , or  $SO_2R^{43}$ ;  $R^{44}$  and  $R^{45}$ , which may be the same or different, are independently hydrogen atom, linear or branched C1-C4 alkyl,  $R^{43}$  is linear or branched C1-C4 alkyl;  $R^{40}$  and  $R^{42}$ , which may be the same or different, are hydrogen, linear or branched C1-C18 alkyl group, linear or branched C2-C18 alkenyl group, sulfonamide group, carboxyl group, mesyl group, hydroxyl group, C1-C18 alkoxy group, acethylamino group, benzoylamino group, halogen atom or  $-CONH-R^{46}$ ;  $R^{46}$  is functional group selected from unsubstituted or substituted linear or branched C1-C18 alkyl or unsubstituted or substituted C6-C18 aryl group;  $L_1$  and  $L_2$  are independently O or COO;  $(E)^+$  are  $H^+$ , cation of alkali metal, ammonium ion, cations of organic amine including aliphatic primary, secondary and tertiary amines, quaternary ammonium ion;  $K^3$  is an integer;  $m^3$

is 0, 1 or 2; and  $M^1$  is a metal having ionic valency from 2 to 4.

10. The composition of Claim 8 where in the laser-transmitting black colorant  
5 comprises amine salts of anthraquinone dye of formula [I] where as at least one of  $R^9$ ,  
 $R^{10}$ ,  $R^{11}$ ,  $R^{12}$  and  $R^{13}$  of formula [I-a] is sulfonyl group.

11. The composition of Claim 8 where in the ratio of amount of the amine salts of  
anthraquinone dyes of formula [I] or formula [II] to that of monoazo complex dyes  
of the formula [III] is from 5:1 to 1:1.